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November 17, 2015

Dwight Leisle, Environmental Project Manager
Port of Portland
P.O. Box 3529
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Re: DEQ Review "Evaluation of Data from Incremental Sampling Methodology Soil Data"
ECSI No. 271

Dear Mr. Leisle:

The Department of Environmental Quality (DEQ) reviewed the January 20, 2105, *Evaluation of Data from Incremental Sampling Methodology Soil Data,* prepared for the Port of Portland by Formation Environmental. Thank you for this submittal DEQ appreciates the Port's continued efforts in addressing this portion of the site.

The memorandum screens results from a 30 point incremental sampling methodology (ISM) sample collected along the Daimler Leasehold riverbank (a subsection of Operable Unit 5) against DEQ Level II SLVs for copper, lead and zinc. The memorandum concludes that by considering the ISM sample equivalent to the 90UCL as an estimate of exposure, the results suggest that risk is acceptable for this section of OU5, and further remediation is not needed to bring exposure into acceptable ranges.

At this time DEQ does not agree that the ISM sample sufficiently demonstrates that unacceptable ecological risk is not present outside of the proposed source control measure area.

General Comments

The objectives of the sampling are stated to "collect additional data from southernmost section to further characterize risk from copper to birds." However, the OU5 area data are compared to the lowest SLV also using plant and invertebrate criteria. This confuses the data quality objectives for the sampling given these receptors are evaluated on a point by point basis and not on an incremental average.

Specific Comments

1. Table 1 of the memorandum includes DEQ plant and invertebrate SLVs where the 5x factor has been incorporated, previous DEQ comments indicated 1x the SLV is the appropriate comparison given these are maximum allowable concentrations. Please see previous comment on this, along with the recommended use of Eco SSL values and site specific LOAEL SLVs shown in Table 1 below. SLV exceedances are shown in bold.

Table 1, COC Terrestrial SLVs for plants and invertebrates

Contaminant of Interest	Regional 95% UPL Default Background Concentrations (mg/kg)	Terrestrial Invertebrate SLV (mg/kg) EPA Eco SSL	Plant SLV (mg/kg) EPA Eco SSL	Bird LOAEL SLV (mg/kg)[a]	Mammalian LOAEL SLV (mg/kg)[a]	Lowest Hot Spot (mg/kg)	ISM Sample Result (mg/kg)
Copper	34	**80**	**70**	**80**	**82**	700	99
Lead	79	500	120	**33**	NA	330	42
Zinc	180	120	160	NA	NA	1200	259

NA: Not presented because not identified as a risk in the 2012 ERA.

[a] LOAEL soil SLV calculated using EPA Ecological soil screening level methodology (EPA, 2012) using food and soil ingestion parameters used in the Swan Island Sept. 12, 2012 ecological risk assessment and incorporating DEQ's comments on the document (e.g. recommended LOAEL toxicity reference values). Acceptable soil concentrations are calculated as For the RBC calculations, exposure is estimated by solving for a hazard quotient of 1 as follows: $HQ=[(C\_s \times P\_s \times FIR)+(C\_biota \times P\_b \times FIR)]/TRV$

Where:

Cs = concentration of contaminant in soil (mg/Kg [dry weight])

Ps = Soil ingestion as proportion of diet (unitless)

Pb = Biota ingestion as proportion of diet (unitless)

FIR = food ingestion rate (kg food [dry weight]/kg body weight [wet weight]/day)

Cbiota = Concentration of contaminant in biota (mg/Kg [dry weight])

TRV = toxicity reference value.

2. Birds and mammals cannot be fully assessed due to the limited exposure area sampled within the incremental sample relative to the larger exposure area of OU5. Within the 800 feet exposure unit defined in this memo (the whole of the Daimler Leasehold riverbank area) the incremental average values are above bird and mammal risk levels. This incremental sample cannot be statistically combined with other composite and discrete samples in the riverbank, making it difficult to incorporate the ISM sample into the whole OU5 exposure unit evaluation. The ISM sample also precludes a rerun of the probability of exposure analyses, which was completed in the 2012 risk assessment. Based on the concentrations of RB-10, WR-164, and RB-08 collected over small areas, these points drove the results of the calculation of a 90% UCL or a probability of exposure analysis. Therefore, the comments on the Jan 2nd 2014 "*Effects of Proposed Source Control Action on Ecological Risk*" still apply. (i.e. The cap area needs to be expanded or additional investigation is needed to demonstrate that significant contamination is not located outside of the area addressed by the proposed source control measure.).

Summary of Correspondence

A summary of correspondence regarding the ecological risk assessment for the OU5 river bank is presented below.

September 2012 - Level II Screening Ecological Risk Assessment for Operable Unit 2

The Port submitted a Level II Screening Ecological Risk Assessment for Operable Unit 2 in September 2012[1]. The assessment determined that concentrations of copper (plants, invertebrates, birds, mammals), lead (birds), and zinc (plants, invertebrates, birds, mammals) exceed screening levels. The assessment concluded exceedances for plants and invertebrates appear to be isolated and the relatively disturbed and ruderal nature of the vegetation community makes it unlikely that this area provide substantial ecological function in the local area. An expanded Level II exposure analysis and the population-level probabilistic evaluation suggests that exposure of birds do not exceed the acceptable risk level set by DEQ based on LC50/LD50 endpoints. Therefore, ecological risk at the site is within acceptable ranges and no remedial action is needed to protect ecological receptors and ecological function in the area.

June 17, 2013 – DEQ's Review of Level II Ecological Risk Assessment for Operable Unit 2

DEQ's June 17, 2013 review of the Level II Screening Ecological Assessment concluded the following:

1) **Zinc**: Risk limited to plants and invertebrates
   - Birds: Acceptable risk.
   - Mammals: Acceptable risk based on DEQ's expanded assessment.
   - Plants and Invertebrates: Unacceptable risk; exceedances appear to be widespread.
2) **Lead**: Risk of exposure to lead is marginally unacceptable for birds and acceptable for mammals. Plant exposure is above risk levels.
   - Birds: Marginal unacceptable risk. For birds, lead risk levels appear to be slightly above or equal to acceptable risk levels. Discrete and composite samples proved virtually the same results.
   - Mammals: Acceptable risk based on DEQ's expanded assessment.
   - Plants: Exceeds risk levels.
3) **Copper:** Risk of exposure to copper is unacceptable to multiple levels of the ecosystem including birds, mammals, plants and invertebrates. This appears to be the driver of terrestrial risk in the riverbank.
   - Birds: Unacceptable risk.
   - Mammals. Unacceptable risk. For mammals, the TRV would have to be 70 mg/kg/day (discrete) to be acceptable, which is significantly higher than DEQ's selected LOAEL of 9.3 mg/kg/day and most mortality LOAELs provided in EPA 2005. Therefore, unacceptable risk is identified to mammals from exposure to copper.
   - Plans and Invertebrates: Unacceptable risk.

[1] (Formation 2012). Final Level II Screening Ecological Risk Assessment Portland Shipyard, Operable Unit 2 Swan Island Upland Facility, Prepared by Formation Environmental on behalf of the Port of Portland. September 2012.

November 19, 2013-Effects of Proposed Source Control Action on Ecological Risk: Swan Island Upland Facility, Operable Unit No. 2.

The Port's November 19, 2015 memorandum presented updates to the risk assessment calculations based on elimination of select sample points and modified risk calculations. The Port concluded that proposed source control action which entailed placing riprap armoring at two locations on the riverbank will reduce exposure of terrestrial biota to elevated concentrations of metals and is sufficient to address unacceptable risk at the site.

February 18, 2014 – DEQ's Review of Effects of Proposed Source Control Action on Ecological Risk: Swan Island Upland Facility, Operable Unit No. 2.

DEQ's February 19, 2014 review concluded that the cap area needs to be expanded or additional investigation is needed to demonstrate that significant contamination is not located outside of the area addressed by the proposed source control measure.

Conclusions

Based on DEQ's review of *Evaluation of Data from Incremental Sampling Methodology Soil Data* and previous submittals by the Port, additional investigation would be needed to demonstrate that unacceptable levels of ecological risk are not presents outside of the proposed source control measure areas.

It is unclear if the final in-water Portland Harbor remedy will address any portion of the riverbank. It may be prudent to wait until EPA completes the remedial design for this portion of the river before completing a feasibility study. However, based on the current evaluations completed by the Port, there appears to be unacceptable risk to ecological receptors that will need to be addressed in order for DEQ to issue a No Further Action (NFA) for OU5.

If you have any questions or concerns regarding these comments please feel free to contact me at (503) 229-5354.

Sincerely,

David Lacey
Project Manager
Portland Harbor Section

cc: Herb Clough, Ash Creek Associates, Inc.
Michael Pickering, Ash Creek Associates, Inc.
Eva DeMaria, EPA
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